Watershed: **Merced River**

Years Sampled: **2008, 2010-2011, 2014**

Study Objectives:

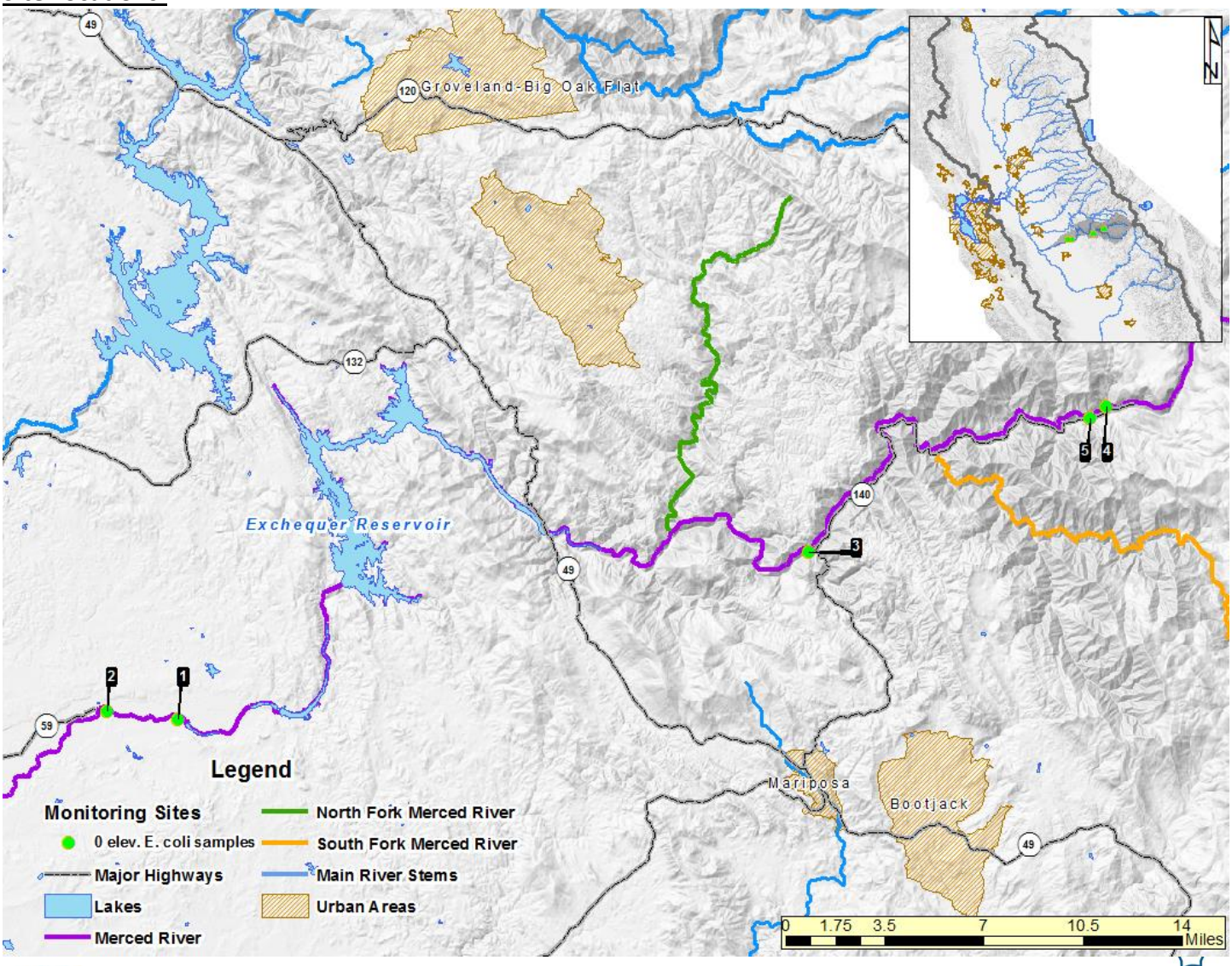
1. Is there any evidence that beneficial uses are being impacted, and if so, what are potential contributors?
2. Are there any noticeable regional, seasonal or trends observed in the water quality data?
3. What are pathogen concentrations at selected monitoring sites?

KEY STATISTICS

Number of sites sampled	**5**
Sampled by	**Water Board Staff (Sac)**
	Upper Merced Watershed Council
Number of sites sampled for pathogens	**0**
Number of total samples	**33**
Sampling Frequency	**2x/mo. (May-Sept.)**
Assessment Threshold	**320 MPN/100 mL**

Message: **None of the 33 samples collected have had elevated *E. coli*.**

Site Locations:



Summary of Results:

Table 1: Field Measurements

Station Code	Map #	Station Name	Oxygen, Dissolved (mg/L)		pH		SpConductivity (uS/cm)		Temperatiure (˚C)		Turbidity (NTU)	
			Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
535MER209	1	Merced River at Merced Falls Gauging Street	10.73	10.73	7.84	8.06	25.0	26.0	17.65	19.11	NR	NR
535MER210	2	Merced River at Henderson Park	11.32	11.32	7.80	8.44	27.0	41.0	16.59	20.25	1.23	1.34
537MAR204	3	Briceburg Beach near Bluff Creek Road	7.50	11.80	6.60	7.20	NR	NR	7.30	21.70	0.23	2.11
537MAR210	4	Crane Creek near Tuolumne River Road	7.90	10.70	6.90	7.50	20.0	20.0	6.80	20.20	0.27	2.54
537MAR900	5	Merced River at El Portal ("Patty's Hole")	8.30	10.90	7.00	8.33	43.0	43.0	4.80	24.30	0.04	1.49

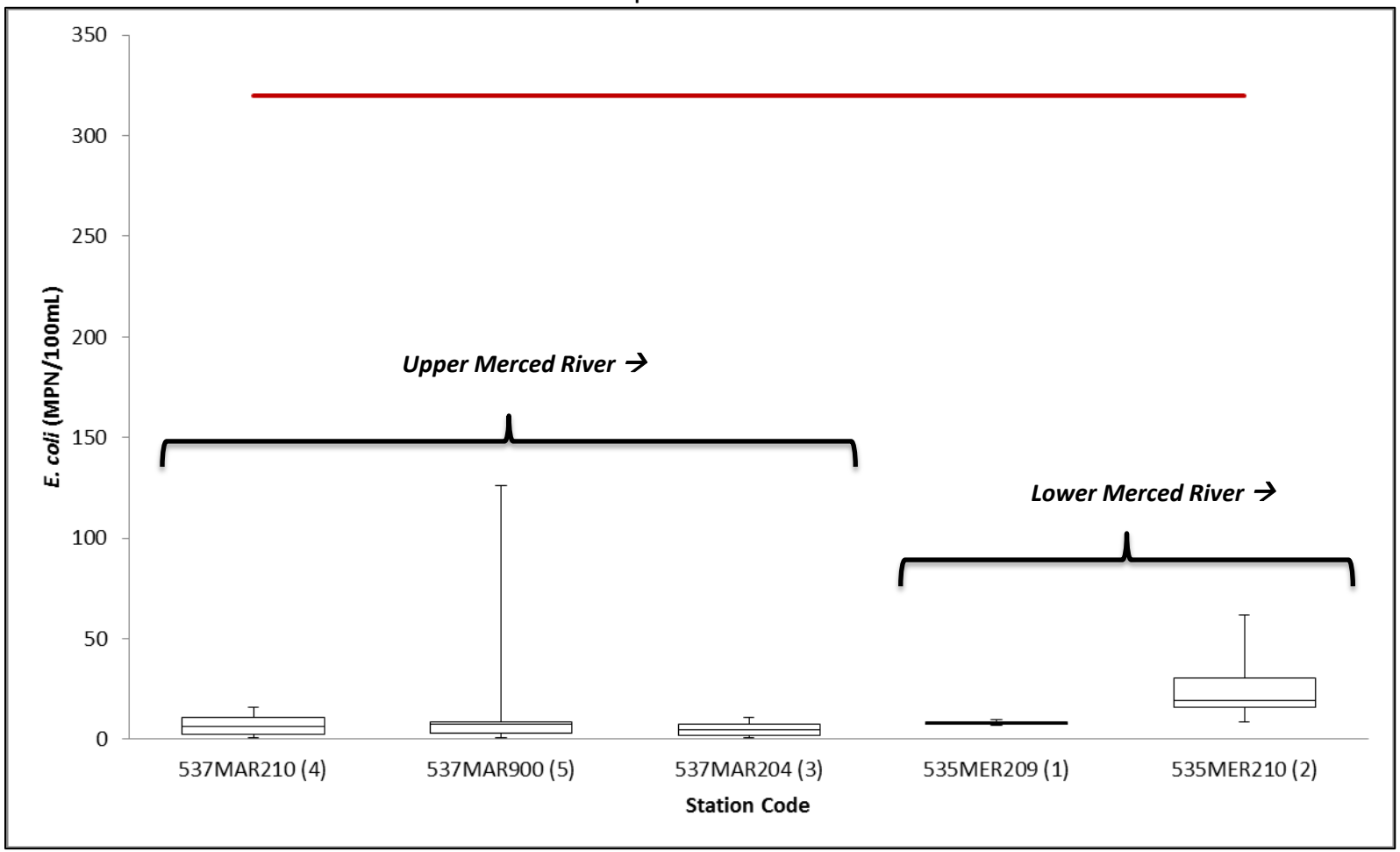
NR: Not Recorded

Table 2: *E. coli* and Pathogen Results

Map #	E. coli (MPN/100ml)					*Cryptosporidium* (cysts/L)			*Giardia* (oocysts/L)			*Salmonella* (MPN/100mL)			*E.Coli* O157:H7 (Presence/Absence)		
	Mean	Min	Max	Count	>320	Max Result	Count	(+)	Max Result	Count	(+)	Max Result	Count	(+)	Result	Count	(+)
1	8.1	7.2	9.6	3	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
2	27.2	8.5	62.0	4	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
3	5.0	1.0	10.9	8	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
4	7.1	1.0	15.8	7	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0
5	17.1	1.0	125.9	11	0	NA	0	0	NA	0	0	NA	0	0	NA	0	0

E.coli - Highlighted Cells: Exceeds EPA Guidline of 320 MPN/100ml Pathogens- (+): positive result, Highlighted Cells: positive results, NA: Not Applicable

Graph 1: *E Coli* Results



4,5,3 = progressive DS flow along upper Merced River; 1,2 = progressive DS flow along Merced River (below Exchequer Reservoir)

WHAT IS THE MEASURE SHOWING?

While best known for draining from Yosemite Valley, the Merced River is also an important source of irrigation for the Central Valley. Comprised of a North and South Fork, it spans roughly 150 miles from the western flank of the Sierra Nevada to the northbound San Joaquin River. Flow is maintained by the Exchequer Reservoir, also known as McClure Lake. Field measurements for each site are shown in Table 1.

Results show that 0 of 33 samples exhibited elevated levels of *E.coli* (shown in Table 2). All of the results are well below the EPA recommended guideline of 320 MPN/100 mL (shown in Graph 1).

The watershed is primarily forest (Jin et al., 2013), yet potential non-point and urban sources are present. Parts of the watershed are heavily utilized for recreational activities, and it is home to numerous waterfowl and other wildlife.

No sites in the Merced River watershed were sampled for pathogens.

WHY THIS INFORMATION IS IMPORTANT?

In 2012, the USEPA amended recreational water quality guidelines for human health under the Clean Water Act, specifying the standard threshold value (STV) for the indicator bacteria *E. coli* as 320 colony-forming units (CFU) per 100 milliliters (mL). The STV represents the 90% percentile of the water quality distribution, beyond which the water body is not recommended for recreation (Nappier & Tracy, 2012).

E. coli is an indicator of potential fecal contamination and risk of illness for those exposed to water (e.g. when swimming). Since *E. coli* is only an indicator of potential pathogens and does not necessarily identify an immediate health concern, the data collected from this study provide more information on pathogen indicators as well as specific water-borne pathogen concentrations to better assess their impact on the beneficial use of recreation and to identify potential contributors by sub watershed.

WHAT FACTORS INFLUENCE THE MEASURE?

E. coli and specific water-borne pathogens can come from human or animal waste and may be highly mobile and variable in flowing streams. In addition to human recreational use, the presence of pathogens in water may be the result of cattle grazing, wildlife, urban and agricultural runoff, or sewage spills. The physical condition of the watershed may also influence pathogen measurements, however in this study field measurements (temperature, SC, DO, turbidity and pH) were variable between sites and it is unclear if these constituents had an effect on the *E. coli* or pathogen measurements.

TECHNICAL CONSIDERATIONS:

- Data available at: CEDEN
- *E. coli* is only an indicator of potential pathogens and does not necessarily identify an immediate health concern.
- Public reports and fact sheets are available at: http://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_studies/surface_water_ambient_monitoring/swamp_regionwide_activities/index.shtml

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Jin, S., Yang, L., Danielson, P., Homer, C., Fry, J., and Xian, G. A Comprehensive change detection method for updating the National Land Cover Database to circa 2011. Multi-Resolution Land Characteristics Consortium [Internet]. c2013 – [cited January 2015]. Available from: http://www.mrlc.gov/nlcd2011.php

Nappier, Sharon, Tracy Bone. 2012 Recreational Water Quality Criteria. Environmental Protection Agency [Internet]. Sacramento, CA. c2012 – [cited January 2015]. Available from: http://water.epa.gov/scitech/swguidance/standards/criteria/health/recreation/upload/factsheet2012.pdf